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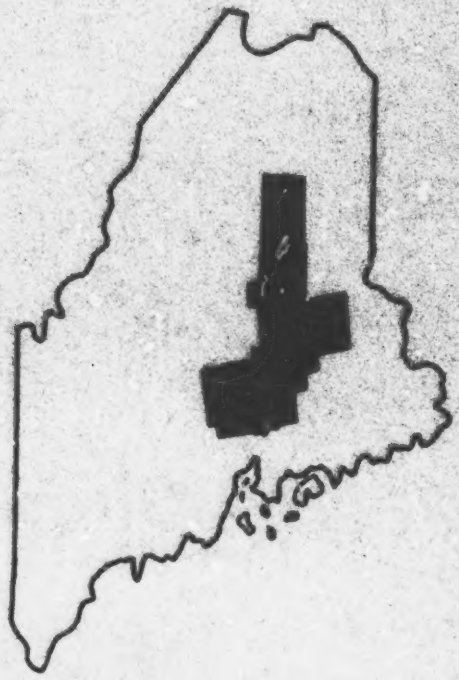
ORIGINAL

FLOOD INSURANCE STUDY

TOWN OF HAMPDEN, MAINE
PENOBSCOT COUNTY



SEPTEMBER 4, 1987

Federal Emergency Management Agency

COMMUNITY NUMBER - 230168

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NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program (NFIP) have established repositories of flood hazard data for floodplain management and flood insurance purposes. This Flood Insurance Study (FIS) may not contain all data available within the repository. It is advisable to contact the community repository for any additional data.

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FLOOD INSURANCE STUDY
TOWN OF HAMPDEN, PENOBSCOT COUNTY, MAINE

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in the Town of Hampden, Penobscot County, Maine, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood risk data for various areas of the community that will be used to establish actuarial flood insurance rates and assist the community in its efforts to promote sound floodplain management. Minimum floodplain management requirements for participation in the National Flood Insurance Program (NFIP) are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

In some states or communities, floodplain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence and the state (or other jurisdictional agency) will be able to explain them.

1.2 Authority and Acknowledgments

The sources of authority for this Flood Insurance Study are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses for this study were prepared by the Soil Conservation Service (SCS) for the Federal Emergency Management Agency (FEMA), under Inter-Agency Agreement No. EMW-84-E-1550, Project Order No. 1. This work was completed in June 1986.

1.3 Coordination

In May 1984, an initial Consultation and Coordination Officer's (CCO) meeting was held with representatives of FEMA, the town, and the SCS (the study contractor) to determine the streams to be studied by detailed methods. Pertinent information was obtained from the U. S. Geological Survey (USGS), E. C. Jordan Company, community officials, the Maine Department of Transportation, the City of Bangor, the Eastern Maine Development District, the U. S. Army Corps of Engineers (COE), and the National Oceanic and Atmospheric Administration. An intermediate CCO meeting was held in April 1986 to discuss the initial results of the study with town officials.

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On October 22, 1986, a final CCO meeting was held with representatives of FEMA, the town, and the study contractor to review the results of the study.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the incorporated area of the Town of Hampden, Penobscot County, Maine. The area of study is shown on the Vicinity Map (Figure 1).

The following streams were studied by detailed methods: the Penobscot River and Souadabscook Stream, for their entire lengths within the community; and Sucker Brook, from its confluence with the Penobscot River to a point approximately 400 feet upstream of the Old County Road. Hammond Pond, Hermon Pond, and Ben Annis Pond were also studied by detailed methods. The areas studied by detailed methods were selected with priority given to all known flood hazard areas and areas of projected development and proposed construction through June 1991.

The following flooding sources were studied by approximate methods: Brown Brook, Burnt Swamp, Patten Pond, Patten Stream, Reed's Brook, Shaw Brook, Ward Stream, West Branch Souadabscook Stream, several unnamed streams, and the remaining portion of Sucker Brook. Approximate analyses were used to study those areas having a low development potential or minimal flood hazards. The scope and methods of study were proposed to, and agreed upon by, FEMA and the Town of Hampden.

2.2 Community Description

The Town of Hampden is located in the southern portion of Penobscot County in south-central Maine. It is bordered by the Town of Hermon and the City of Bangor to the north, the City of Brewer and Town of Orrington to the east, the Town of Winterport to the south, the Town of Newburgh to the west, and the Town of Carmel to the northwest. Hampden is situated on the Penobscot River approximately 5 miles south-southwest of the City of Bangor, Maine's third largest city, and approximately 60 miles northeast of the City of Augusta, the capitol of Maine.

The total land area contained within the Hampden corporate limits 37.5 square miles. The population has increased from 5,250 in 1980 to an estimated 5,365 in 1984 (References 1 and 2). Approximately 90 percent of the land area of Hampden is forested, 5 percent used for agricultural purposes, and the remaining 5 percent developed. Within the floodplains

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FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF HAMPDEN, ME

(PENOBSCOT CO.)

APPROXIMATE SCALE

4 0 4 8 12 MILES

VICINITY MAP

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studied in the community, development consists of single-family residences, businesses, and recreational property. Development in Hampden is heaviest along U. S. Route 1A; however, its proximity to the Bangor metropolitan area and Interstate Route 95 has resulted in substantial residential development throughout the town and commercial development in its northeastern sector. Recreational development is heavy along Hermon Pond and increasing along the Penobscot River.

The Penobscot River, with a drainage area of 8,592 square miles, is Maine's largest river basin. It flows in a southern direction for approximately 102 miles to Penobscot Bay and forms Hampden's eastern corporate limits.

Souadabscook Stream, the Penobscot River's ninth largest tributary, has a drainage area of 152.2 square miles. It flows east-southeast for 18.9 miles from the outlet of Etna Pond to its confluence with the Penobscot River in Hampden.

Sucker Brook, a small tributary of the Penobscot River, has a drainage area of 3.4 square miles and a length of 2.8 miles.

Hammond Pond is located in northwestern Hampden on the Souadabscook Stream. It has a surface area of 83 acres and a drainage area of 123.7 square miles. Hermon Pond and Ben Annis Pond, also located in the Souadabscook Watershed, form a portion of Hampden's northwestern corporate limits. Hermon Pond has a surface area of 461 acres and a drainage area of 93.4 square miles at its outlet. Ben Annis Pond has a drainage area of 10.4 square miles and a surface area of 25 acres.

The Hampden area receives a mean annual precipitation of 41 inches, which includes the water equivalent of 75 inches of snow. The precipitation is evenly distributed throughout the year; however, snowmelt accounts for a large part of the runoff. The mean annual temperature of the town is approximately 41.8 degrees Fahrenheit (°F), ranging from means of 15.6°F in January to 66.8°F in July (Reference 3).

2.3 Principal Flood Problems

The history of floods in Hampden has indicated that most flooding occurs in the winter or early spring months as a result of heavy rainfall on snow-covered or frozen ground. Flooding in the summer months is most often associated with thunderstorms, although tropical hurricanes occasionally generate prolonged heavy rainfall in the area.

The major flood damage in Hampden is to single-family residences, recreational properties, businesses, roads, and bridges. Properties on Souadabscook Stream between Hermon Pond and Hammond Pond, and along the lower portion of Sucker Brook experience the most frequent flood problems.

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USGS stream gage No. 01036390, with records dating back to 1979, is located on the Penobscot River in Eddington (Reference 4). The flood of record at this gage occurred on June 3, 1984. Its frequency is estimated to be approximately 25 years, with a peak discharge of 136,000 cubic feet per second (cfs) at the gage. The flood of record on the Penobscot River occurred on May 1, 1923. It had a recorded discharge of 153,000 cfs at USGS stream gage No. 01034500 in West Enfield, and an estimated recurrence interval of 120 years. Other notable floods have occurred in 1807, 1846, 1853, 1866, 1869, 1870, 1887, 1901, 1909, 1923, 1936, 1973, 1976 (only known tidal flood), and 1983.

There is no gage data available for any of the other streams that were studied in detail in Hampden; however, a high-water mark was observed on Souadabscook Stream just upstream of the Hampden Dam in 1983. That flood reached an elevation of 26.0 feet and is estimated to have a return period of 10 years.

2.4 Flood Protection Measures

There are no flood protection structures existing or planned in the Town of Hampden.

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude which are expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10, 2, 1, and 0.2 percent chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood which equals or exceeds the 100-year flood (1 percent chance of annual exceedence) in any 50-year period is approximately 40 percent (4 in 10), and, for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

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3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for each flooding source studied in detail affecting the community.

Flood discharges on the Penobscot River in Hampden were computed from data contained in the Flood Insurance Study for the City of Bangor (Reference 5). Discharges from the Bangor study were in agreement with a log-Pearson Type III analysis of USGS stream gage No. 01034500 on the Penobscot River at West Enfield (References 6 and 4). That analysis utilized 82 years of gage records and was prepared for a Flood Plain Management Study in the Town of Howland (Reference 7). Discharges at sites in Hampden were computed using the following equation:

$$Q_s = Q_g \ (A_s/A_g)^{0.80}$$

where Q_s is the discharge at the site, Q_g is the discharge from the Bangor study, A_s is the drainage area of the site, A_g is the drainage area of the location in Bangor (8,024 square miles).

Discharges of Souadabscook Stream and Sucker Brook were generated from the SCS Technical Release No. 20 hydrologic evaluation model and checked against the USGS regression equation for Maine (References 8 and 9).

A summary of the drainage area-peak discharge relationships for the streams studied by detailed methods is shown in Table 1, "Summary of Discharges."

TABLE 1 - SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
PENOBSCOT RIVER					
Downstream of Souadabscook Stream	8,210.0	113,600	155,300	174,100	220,000
Upstream of corporate limits	8,027.3	111,500	152,500	171,100	216,100
SOUADABSCOOK STREAM					
At U. S. Route 1A	152.0	3,310	4,680	5,220	6,630
At Manning Mill Road	140.4	3,090	4,380	4,880	6,190
SUCKER BROOK					
At U. S. Route 1A	2.7	570	870	1,020	1,310

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Water-surface elevations for Hammond, Hermon, and Ben Annis Ponds were generated from the SCS Technical Release No. 20 hydrologic evaluation model's reservoir routing procedure (Reference 8).

The stillwater elevations for the 10-, 50-, 100-, and 500-year floods have been determined for Hammond Pond, Hermon Pond, and Ben Annis Pond and are summarized in Table 2, "Summary of Stillwater Elevations."

TABLE 2 - SUMMARY OF STILLWATER ELEVATIONS

FLOODING SOURCE AND LOCATION	ELEVATION (feet) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
HAMMOND POND				
Entire shoreline within community	126.3	128.4	129.0	130.5
HERMON POND				
Entire shoreline within community	126.3	128.4	129.0	130.5
BEN ANNIS POND				
Entire shoreline within community	126.3	128.4	129.0	130.5

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals.

Cross sections for the streams studied by detailed methods were obtained from aerial photographs at a scale of 1:14,400 (Reference 10). The below-water sections were obtained from field surveys. All bridges, dams, and culverts were surveyed to obtain elevation data and structural geometry.

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1). For stream segments for which a floodway was computed (Section 4.2), selected cross-section locations are also shown on the Flood Insurance Rate Map (Exhibit 2).

Water-surface elevations of floods of the selected recurrence intervals were computed using the SCS WSP-2 computer program (Reference 11). Flood

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profiles were drawn showing computed water-surface elevations for floods of the selected recurrence intervals. The starting water-surface elevations for the Penobscot River were taken at the mean spring high tide elevation in Frankfort, Maine, approximately 7.8 miles downstream of the Hampden-Winterport corporate limits. For Souadabscook Stream and Sucker Brook, the starting water-surface elevations were taken from the mean spring high tide at their confluences with the Penobscot River.

Roughness factors (Manning's "n") used in the hydraulic computations were chosen by engineering judgment and based on field observations of the streams and floodplain areas. The channel and overbank "n" values for the streams studied by detailed methods are shown in the following tabulation:

Stream	Channel "n"	Overbank "n"
Penobscot River	0.035	0.080-0.095
Souadabscook Stream	0.012-0.055	0.040-0.092
Sucker Brook	0.065-0.070	0.070-0.090

The hydraulic analyses for this study were based on unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

All elevations are referenced to the National Geodetic Vertical Datum of 1929 (NGVD). Elevation reference marks used in this study are shown on the maps; the descriptions of the marks are presented in Elevation Reference Marks (Exhibit 3).

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The NFIP encourages State and local governments to adopt sound floodplain management programs. Therefore, each Flood Insurance Study provides 100-year flood elevations and delineations of the 100- and 500-year floodplain boundaries and 100-year floodway to assist communities in developing floodplain management measures.

4.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1 percent annual chance (100-year) flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2 percent annual chance (500-year) flood is employed to indicate additional areas of flood risk in the community. For the flooding sources studied in detail, the

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100- and 500-year floodplain boundaries have been delineated using topographic maps at a scale of 1:4,800 with a contour interval of 4 feet (Reference 12).

For the streams studied by approximate methods, the boundary of the 100-year flood has been delineated using the Flood Hazard Boundary Map for the Town of Hampden (Reference 13).

The 100- and 500-year floodplain boundaries are shown on the Flood Insurance Rate Map (Exhibit 2). On this map, the 100-year floodplain boundary corresponds to the boundary of the areas of special flood hazards (Zones A and AE), and the 500-year floodplain boundary corresponds to the boundary of areas of moderate flood hazards. In cases where the 100- and 500-year floodplain boundaries are close together, only the 100-year floodplain boundary has been shown. Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

For the streams studied by approximate methods, only the 100-year floodplain boundary is shown on the Flood Insurance Rate Map (Exhibit 2).

4.2 Floodways

Encroachment on floodplains, such as structures and fill, reduces flood-carrying capacity, increases flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard. For purposes of the National Flood Insurance Program, a floodway is used as a tool to assist local communities in this aspect of floodplain management. Under this concept, the area of the 100-year floodplain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream, plus any adjacent floodplain areas, that must be kept free of encroachment so that the 100-year flood can be carried without substantial increases in flood heights. Minimum federal standards limit such increases to 1.0 foot, provided that hazardous velocities are not produced. The floodways in this study are presented to local agencies as minimum standards that can be adopted directly or that can be used as a basis for additional floodway studies.

The floodways presented in this study were computed for certain stream segments on the basis of equal conveyance reduction from each side of the floodplain. Floodway widths were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. The results of the floodway computations are tabulated for selected cross sections

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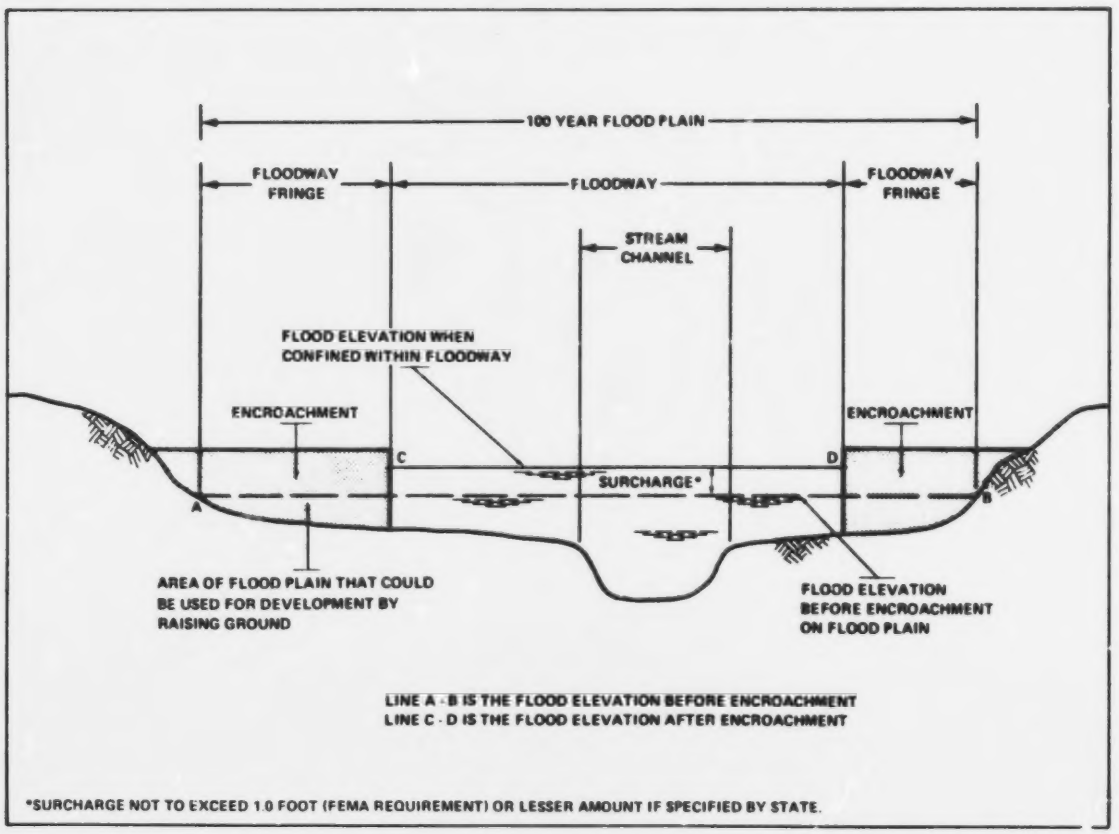
(Table 3). The computed floodways are shown on the Flood Insurance Rate Map (Exhibit 2). In cases where the floodway and 100-year floodplain boundaries are either close together or collinear, only the floodway boundary is shown. Portions of the floodway widths for the Penobscot River extend beyond the corporate limits.

The area between the floodway and 100-year floodplain boundaries is termed the floodway fringe. The floodway fringe encompasses the portion of the floodplain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood by more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 2.


100 YEAR FLOOD PLAIN
FLOODWAY FRINGE
FLOODWAY
FLOODWAY FRINGE
STREAM CHANNEL
FLOOD ELEVATION WHEN CONFINED WITHIN FLOODWAY
ENCROACHMENT
ENCROACHMENT
C
D
SURCHARGE*
A
B
AREA OF FLOOD PLAIN THAT COULD BE USED FOR DEVELOPMENT BY RAISING GROUND
FLOOD ELEVATION BEFORE ENCROACHMENT ON FLOOD PLAIN
LINE A - B IS THE FLOOD ELEVATION BEFORE ENCROACHMENT
LINE C - D IS THE FLOOD ELEVATION AFTER ENCROACHMENT
*SURCHARGE NOT TO EXCEED 1.0 FOOT (FEMA REQUIREMENT) OR LESSER AMOUNT IF SPECIFIED BY STATE.

FLOODWAY SCHEMATIC Figure 2

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FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
Penobscot River								
A	800[1]	1100/525[3]	40,151	4.3	11.8	11.8	12.8	1.0
B	4,960[1]	1110/550[3]	39,908	4.4	12.2	12.2	13.2	1.0
C	9,950[1]	1100/500[3]	37,736	4.6	12.8	12.8	13.8	1.0
D	12,810[1]	885/455[3]	30,150	5.8	13.1	13.1	14.1	1.0
E	16,020[1]	990/435[3]	32,239	5.4	13.8	13.8	14.8	1.0
F	20,130[1]	795/395[3]	31,519	5.4	14.2	14.2	15.2	1.0
G	23,480[1]	1070/535[3]	36,834	4.7	14.8	14.8	15.8	1.0
H	26,390[1]	870/348[3]	31,922	5.4	15.2	15.2	16.2	1.0
I	30,495[1]	895/430[3]	31,211	5.5	15.8	15.8	16.8	1.0
J	32,760[1]	715/320[3]	28,590	6.0	16.0	16.0	17.0	1.0
K	34,430[1]	932/450[3]	31,313	5.5	16.4	16.4	17.4	1.0
Souadabscook Stream								
A	1,245[2]	165	1,681	3.1	13.8	8.9[4]	9.9	1.0
B	2,020[2]	199	2,110	2.5	28.6	28.6	29.6	1.0
C	3,240[2]	111	1,305	4.0	28.8	28.8	29.8	1.0
D	5,810[2]	81	781	6.6	32.1	32.1	33.1	1.0
E	8,535[2]	72	1,162	4.4	46.0	46.0	47.0	1.0
F	12,520[2]	95	966	5.3	49.2	49.2	50.2	1.0
G	13,260[2]	83	959	5.3	58.2	58.2	59.2	1.0
H	13,640[2]	115	576	8.8	66.1	66.1	67.1	1.0
I	14,210[2]	100	728	7.0	68.9	68.9	69.9	1.0

[1]Feet above corporate limits

[2]Feet above confluence with Penobscot River

[3]Width/width within corporate limits

[4]Elevation computed without consideration of backwater effects from Penobscot River

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF HAMPDEN, ME

(PENOBSCOT CO.)

FLOODWAY DATA

PENOBSCOT RIVER-SOUADABSCOOK STREAM

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FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
Souadabscook Stream (continued)								
J	17,725	55	474	10.3	88.2	88.2	89.2	1.0
K	17,900	101	799	6.1	89.8	89.8	90.8	1.0
L	19,100	56	469	10.5	95.7	95.7	96.7	1.0
M	20,685	107	601	8.1	104.1	104.1	105.1	1.0
N	23,195	57	522	9.3	117.6	117.6	118.6	1.0
O	27,800	101	813	5.9	126.0	126.0	127.0	1.0
P	40,920	115	1,207	2.9	129.0	129.0	130.0	1.0
Sucker Brook								
A	0	136	1,174	1.1	15.2	9.1[2]	10.1	1.0
B	1,150	115	916	1.2	15.2	9.4[2]	10.4	1.0
C	2,170	25	199	5.3	15.2	14.1[2]	15.1	1.0
D	3,255	23	193	5.4	23.8	23.8	24.8	1.0
E	3,410	62	397	2.6	26.7	26.7	27.7	1.0
F	3,970	46	216	4.7	30.5	30.5	31.5	1.0
G	4,115	253	992	1.0	31.0	31.0	32.0	1.0
H	4,950	31	154	6.6	46.8	46.8	47.8	1.0
I	5,510	71	619	1.6	56.2	56.2	57.2	1.0

[1]Feet above confluence with Penobscot River

[2]Elevation computed without consideration of backwater effects from Penobscot River

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF HAMPDEN, ME

(PENOBSCOT CO.)

FLOODWAY DATA

SOUADABSCOOK STREAM-SUCKER BROOK

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Near the mouths of streams studied in detail, floodway computations are made without regard to flood elevations on the receiving water body. Therefore, "Without Floodway" elevations presented in Table 3 for certain downstream cross sections of Souadabscook Stream and Sucker Brook are lower than the regulatory flood elevations in that area, which must take into account the 100-year flooding due to backwater from other sources.

5.0 INSURANCE APPLICATION

For flood insurance rating purposes, flood insurance zone designations are assigned to a community based on the results of the engineering analyses. These zones are as follows:

Zone A

Zone A is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no base flood elevations or depths are shown within this zone.

Zone AE

Zone AE is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by detailed methods. In most instances, whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone AH

Zone AH is the flood insurance rate zone that corresponds to the areas of 100-year shallow flooding (usually areas of ponding) where average depths are between 1 and 3 feet. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone AO

Zone AO is the flood insurance rate zone that corresponds to the areas of 100-year shallow flooding (usually sheet flow on sloping terrain) where average depths are between 1 and 3 feet. Average whole-foot depths derived from the detailed hydraulic analyses are shown within this zone.

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Zone A99

Zone A99 is the flood insurance rate zone that corresponds to areas of the 100-year floodplain that will be protected by a Federal flood protection system where construction has reached specified statutory milestones. No base flood elevations or depths are shown within this zone.

Zone V

Zone V is the flood insurance rate zone that corresponds to the 100-year coastal floodplains that have additional hazards associated with storm waves. Because approximate hydraulic analyses are performed for such areas, no base flood elevations are shown within this zone.

Zone VE

Zone VE is the flood insurance rate zone that corresponds to the 100-year coastal floodplains that have additional hazards associated with storm waves. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone X

Zone X is the flood insurance rate zone that corresponds to areas outside the 500-year floodplain, areas within the 500-year floodplain, and to areas of 100-year flooding where average depths are less than 1 foot, areas of 100-year flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 100-year flood by levees. No base flood elevations or depths are shown within this zone.

Zone D

Zone D is the flood insurance rate zone that corresponds to unstudied areas where flood hazards are undetermined, but possible.

6.0 FLOOD INSURANCE RATE MAP

The Flood Insurance Rate Map is designed for flood insurance and floodplain management applications.

For flood insurance applications, the map designates flood insurance rate zones as described in Section 5.0 and, in the 100-year floodplains that were studied by detailed methods, shows selected whole-foot base flood elevations or average depths. Insurance agents use the zones and base flood elevations in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

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For floodplain management applications, the map shows by tints, screens, and symbols, the 100- and 500-year floodplains. Floodways and the locations of selected cross sections used in the hydraulic analyses and floodway computations are shown where applicable.

7.0 OTHER STUDIES

Flood Insurance Studies have been prepared for the Cities of Bangor and Brewer, and the Town of Hermon (References 5, 14, and 15). The flood profiles, base flood elevations, and floodway data for the Penobscot River in the Bangor and Brewer studies are not in agreement with this study. The Bangor and Brewer profiles were started from artificially low elevations at the south Brewer corporate limits; therefore, the flood profiles for the lower reaches of the Penobscot River in those studies are also low. The results of this study supersede the results in the Bangor, Brewer, and Hermon studies.

8.0 LOCATION OF DATA

Information concerning the pertinent data used in preparation of this study can be obtained by contacting FEMA, the Natural and Technological Hazards Division, J. W. McCormack Post Office and Courthouse Building, Room 462, Boston, Massachusetts 02109.

9.0 BIBLIOGRAPHY AND REFERENCES

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EXHIBIT 3 - ELEVATION REFERENCE MARKS

Reference Mark	FIRM Panel	Elevation (Feet NGVD)	Description of Location
RM 1	03	131.581	U. S. Coast & Geodetic Survey (USC&GS) disk stamped N 131 set on northwest wing wall of the Bog Road bridge over the Souadabscook Stream.
RM 2	03	132.00	Chiseled square on top of northwest pier of the southbound lane of Interstate Route 95 bridge over Souadabscook Stream.
RM 3	03	181.53	USC&GS disk stamped JB14, set in bedrock on an island at the intersection of U. S. Route 202/State Route 9 and Shaw Hill Road, 23 feet south of the centerline of Shaw Hill Road.
RM 4	04	136.50	Chiseled square on northwest abutment of the southbound lane of Interstate 95 bridge over Souadabscook Stream.
RM 5	04	137.69	Chiseled square on southwest end of curb on southwest side of the northbound lane of Interstate 95 bridge over Souadabscook Stream.
RM 6	04	123.428	USC&GS disk stamped N 132, set in the top of northwest abutment of the Manning Mill Road bridge over the Souadabscook Stream.
RM 7	04	98.53	Chiseled square on top southwest concrete abutment of the Camp Prentiss dam on Souadabscook Stream.
RM 8	04	97.16	Chiseled square on northeast abutment of the Emerson Mill Road over Souadabscook Stream.
RM 9	04	126.538	USC&GS disk stamped DUNN, set in southwest abutment of Bangor and Aroostook Railraod bridge over Souadabscook Stream.
RM 10	08	78.12	Chiseled square on northeast concrete abutment of the Papermill Road bridge over Souadabscook Stream.

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EXHIBIT 3 - ELEVATION REFERENCE MARKS (continued)

Reference Mark	FIRM Panel	Elevation (Feet NGVD)	Description of Location
RM 11	08	58.29	Chiseled square on southeast abutment of Souadabscook Falls dam on Souadabscook Stream.
RM 12	08	99.95	Chiseled X on nut on baseplate of hydrant along U. S. Route 1A, 0.1 mile north of the Sunset Avenue intersection, 22 feet west of the centerline of U. S. Route 1A.
RM 13	08	130.74	Top valve nut on hydrant along U. S. Route 1A, 345 feet south of the southernmost Old County Road intersection, 21 feet west of the centerline of U. S. Route 1A.
RM 14	09	94.55	Top valve nut on hydrant along U. S. Route 1A, 250 feet south of the intersection with Patterson Street, 24 feet west of the centerline of U. S. Route 1A.
RM 15	09	12.95	Nail set horizontally in power pole closest to the boat ramp at Hampden Marina.
RM 16	09	29.92	Painted bolt, left most bolt on northwest abutment of U. S. Route 1A culvert over Sucker Brook.
RM 17	09	53.54	Chiseled X, on southwest top of Old County Road culvert over Sucker Brook.
RM 18	09	42.11	Top valve nut on hydrant along U. S. Route 1A, 0.3 mile north of the intersection with Wheeldon Heights, 21 feet west of the centerline.
RM 19	20	165.160	USC&GS disk, reset 1958, set in the center of a 3-foot by 3-foot exposed portion of a rock along U. S. Route 202 and State Route 9 at the intersection with the Bangor and Aroostook Railroad, 70 feet north of the road centerline and 160 feet west of the west rail, approximately 8 feet above the level of the track.

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EXHIBIT 3 - ELEVATION REFERENCE MARKS (continued)

Reference Mark	FIRM Panel	Elevation (Feet NGVD)	Description of Location
RM 20	21	119.49	Top northwest corner of Maine Department of Transportation granite highway monument located 10 miles south of Hampden Post Office along U. S. Route 202/State Route 9, 107 feet east of utility pole #523 25, 49 feet north of centerline of U. S. Route 202/State Route 9.
RM 21	21	78.84	Chiseled square on southwest abutment of the U. S. Route 202 bridge over Souadabscook Stream.
RM 22	21	27.25	Red painted bolt on southwest abutment of the U. S. Route 1A/State Route 9 bridge over Souadabscook Stream at the Hampden Dam.
RM 23	21	169.09	Top valve nut on hydrant along U. S. Route 1A, immediately south of Hampden Academy, 30 feet north of telephone pole #1319 29 feet east of centerline of road.
RM 24	21	8.71	Steel pin set in rock by abandoned camp on west bank of the Penobscot River, 3,300 feet downstream from confluence of Reeds Brook.
RM 25	21	224.06	Top valve nut on hydrant along U. S. Route 1A, 50 feet south of centerline of Hopkins Road and 18 feet east of U. S. Route 1A centerline.
RM 26	23	136.32	Top valve nut on hydrant along U. S. Route 1A, 0.5 mile north of Winterport, 30 feet north of telephone pole #1214, 56 feet west of centerline of U. S. Route 1A.
RM 27	23	54.62	Top valve nut on hydrant along U. S. Route 1A, 111 feet north of the Winterport/Hampden townline signpost, 30 feet west of centerline of U. S. Route 1A.

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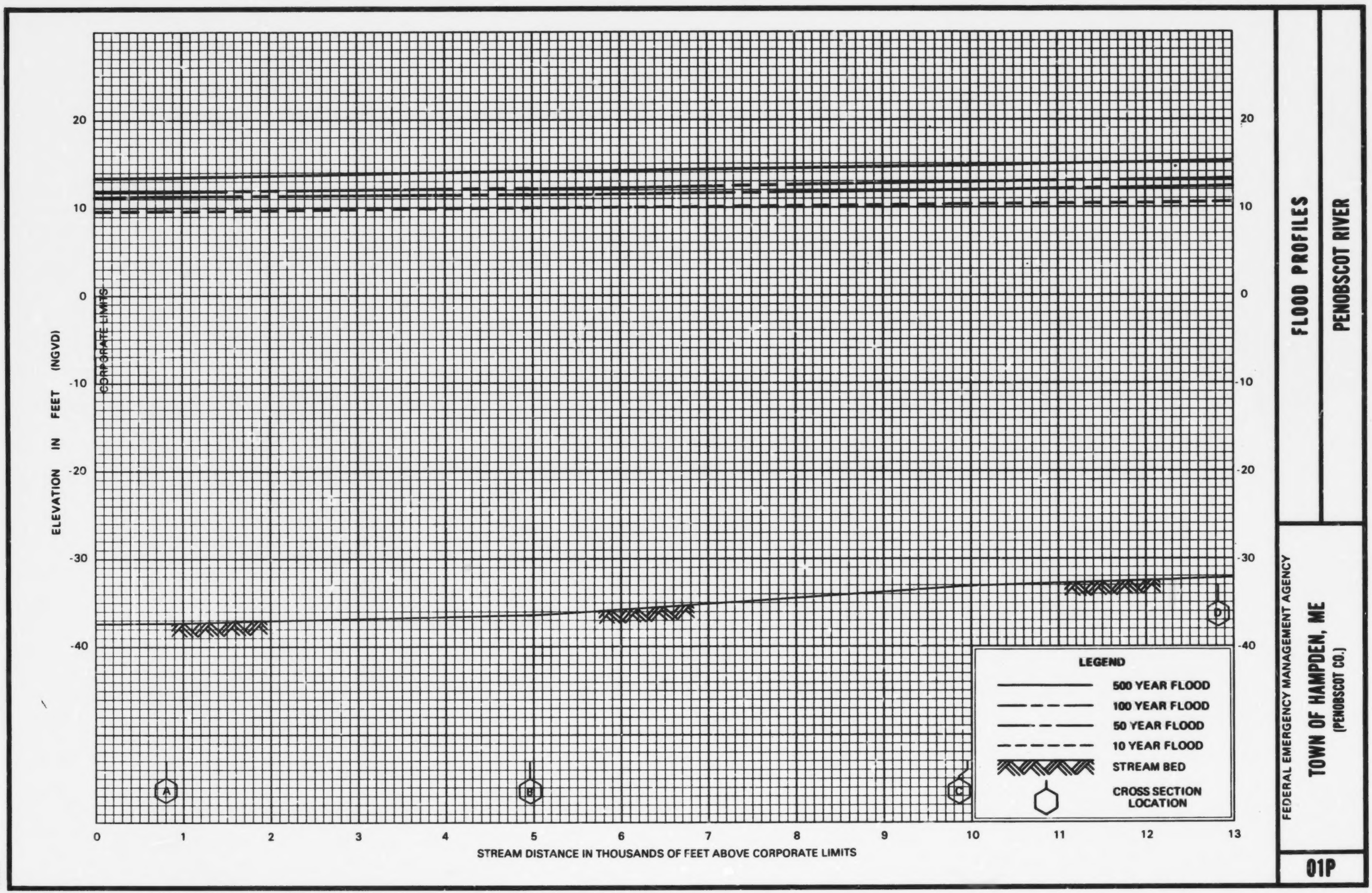

FLOOD PROFILES

PENOBSCOT RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF HAMPDEN, ME

(PENOBSCOT CO.)

01P

124486

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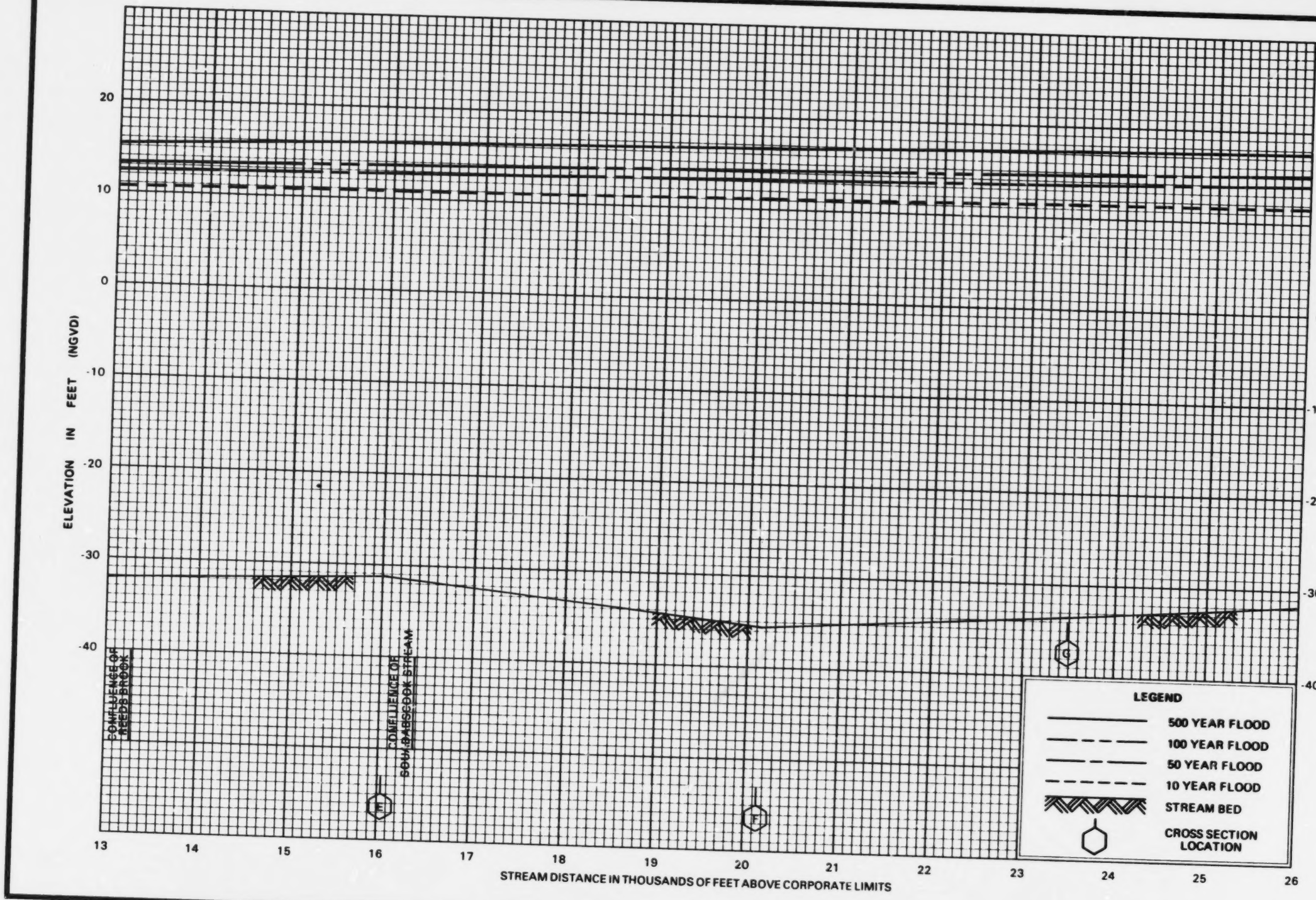

FLOOD PROFILES

PENOBSCOT RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF HAMPDEN, ME

(PENOBSCOT CO.)

02P

124466

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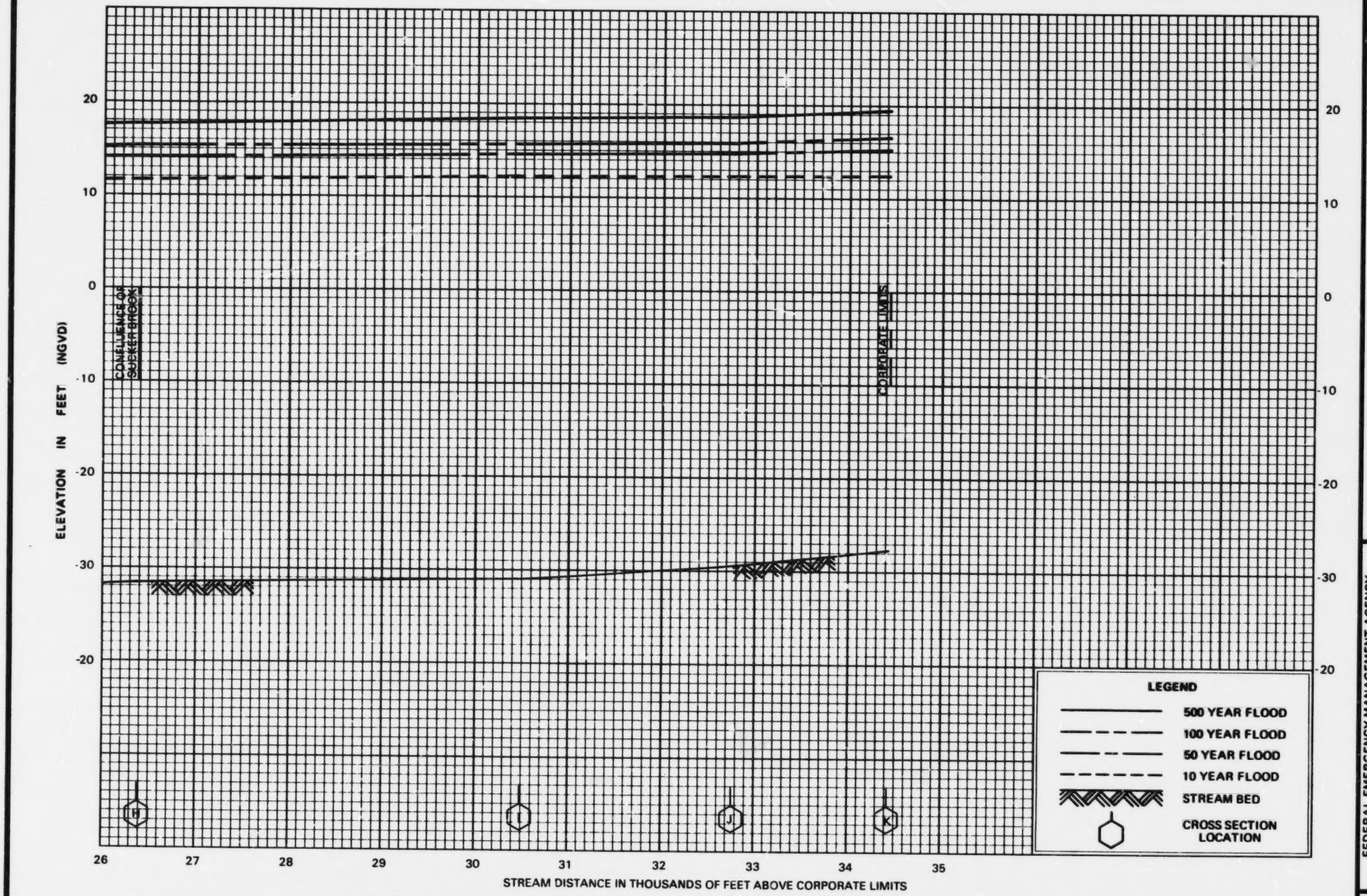

FLOOD PROFILES

PENOBSCOT RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF HAMPDEN, ME
(PENOBSCOT CO.)

03P

134466

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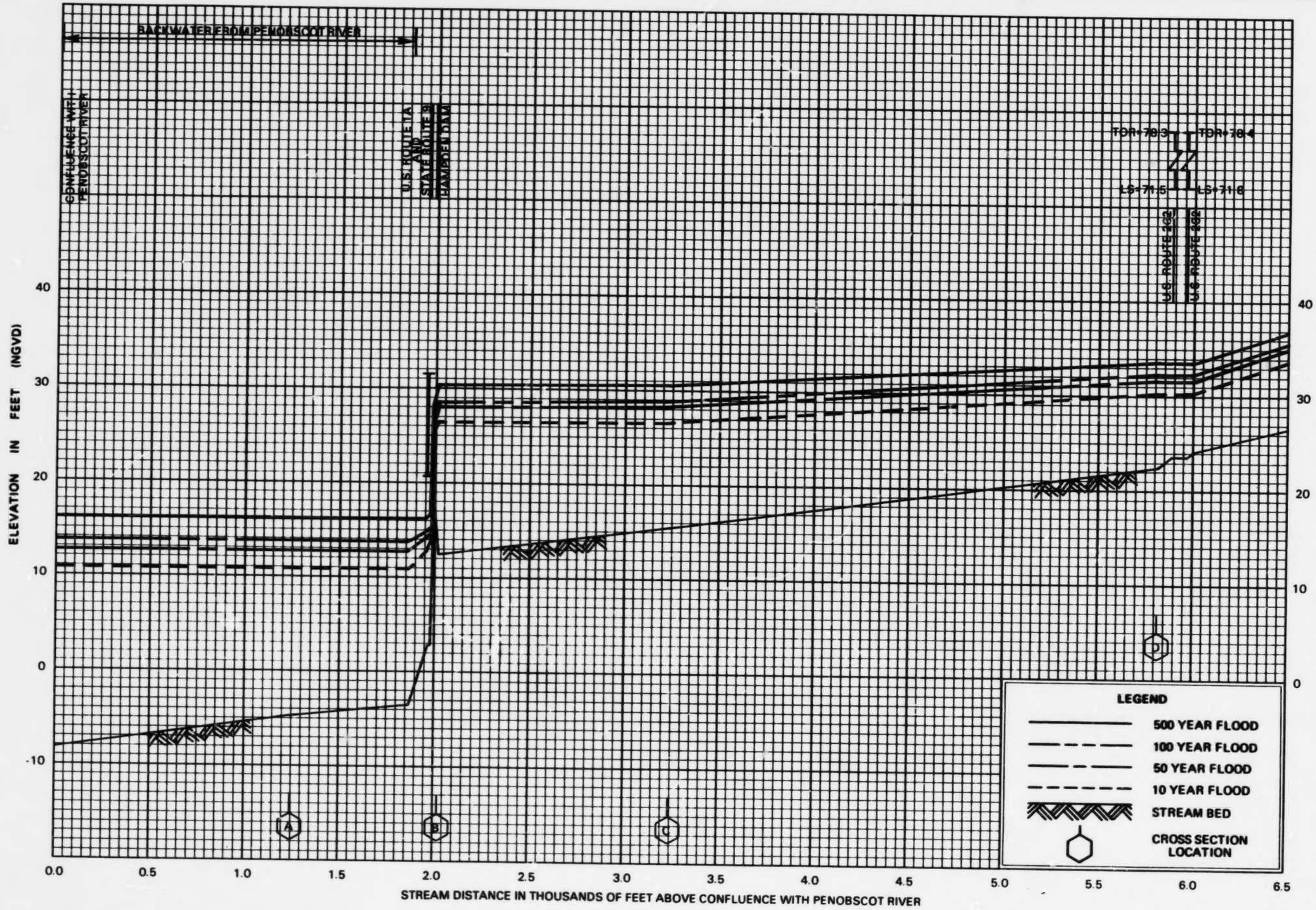

FLOOD PROFILES

SOUADABSCOOK STREAM

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF HAMPDEN, ME

(PENOBSCOT CO.)

04P

124488

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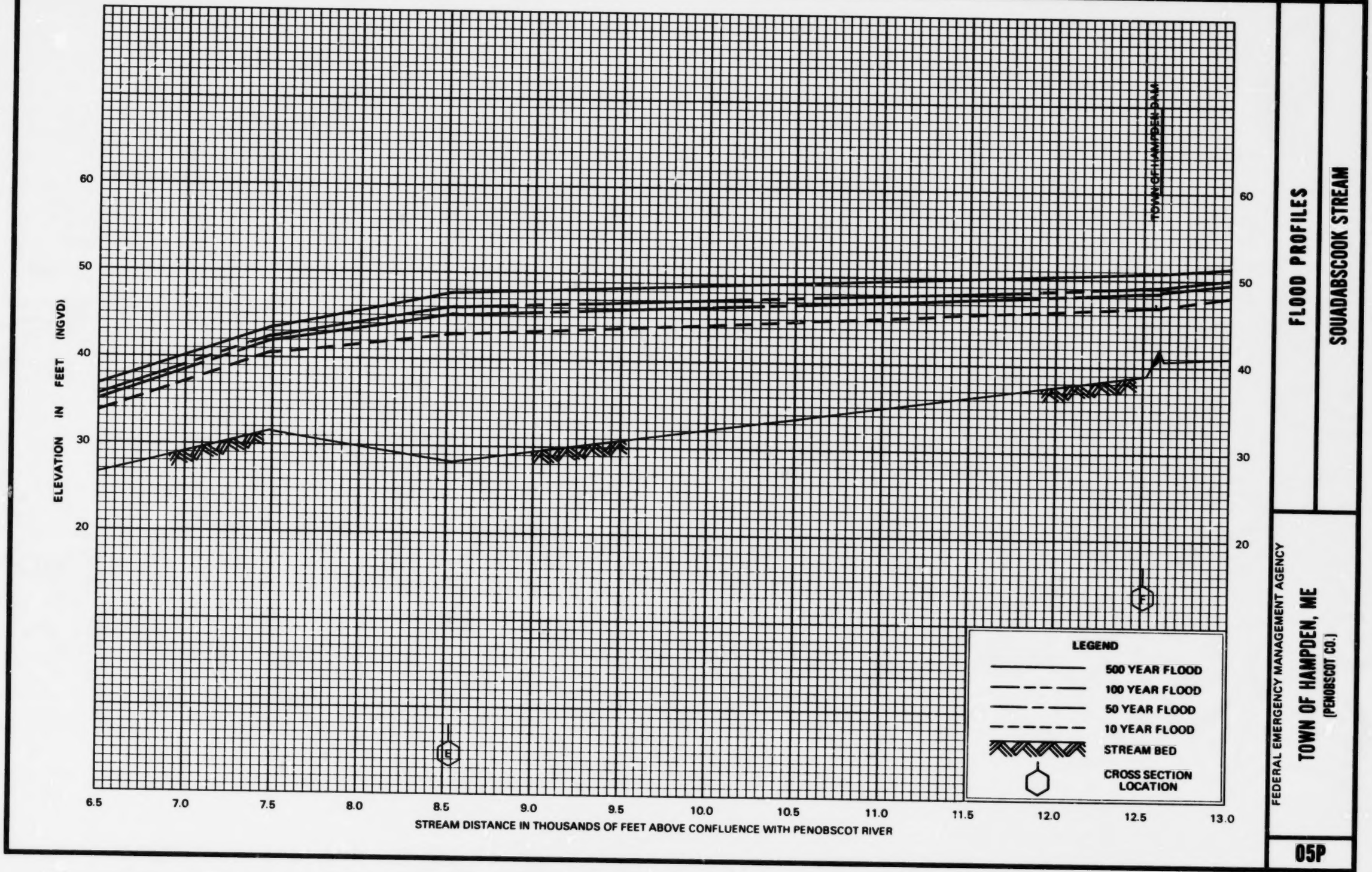

FLOOD PROFILES

SOUADABSCOOK STREAM

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF HAMPDEN, ME

(PENOBSCOT CO.)

05P

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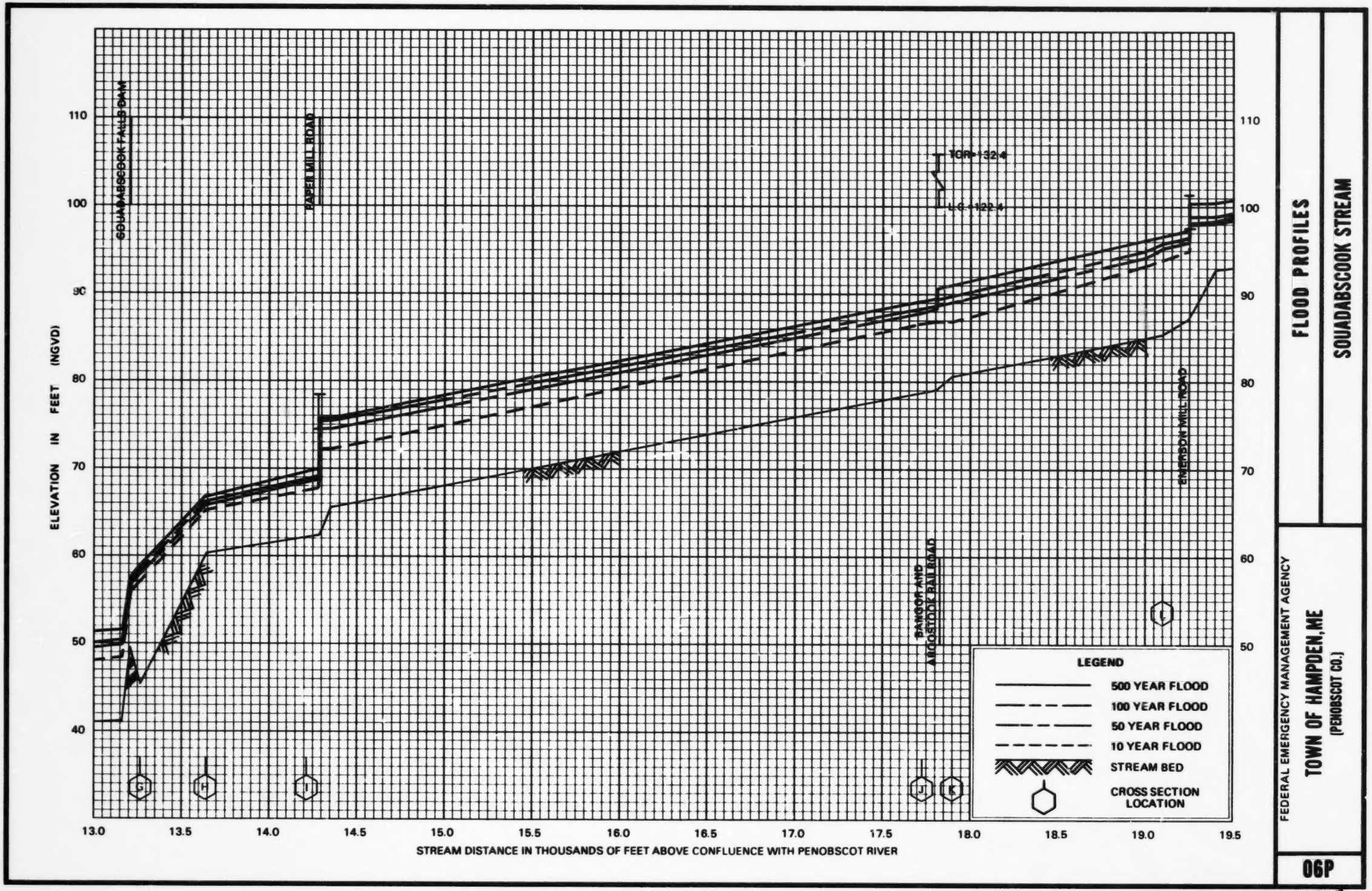

FLOOD PROFILES

SQUADABSCOOK STREAM

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF HAMPDEN, ME

(PENOBSCOT CO.)

06P

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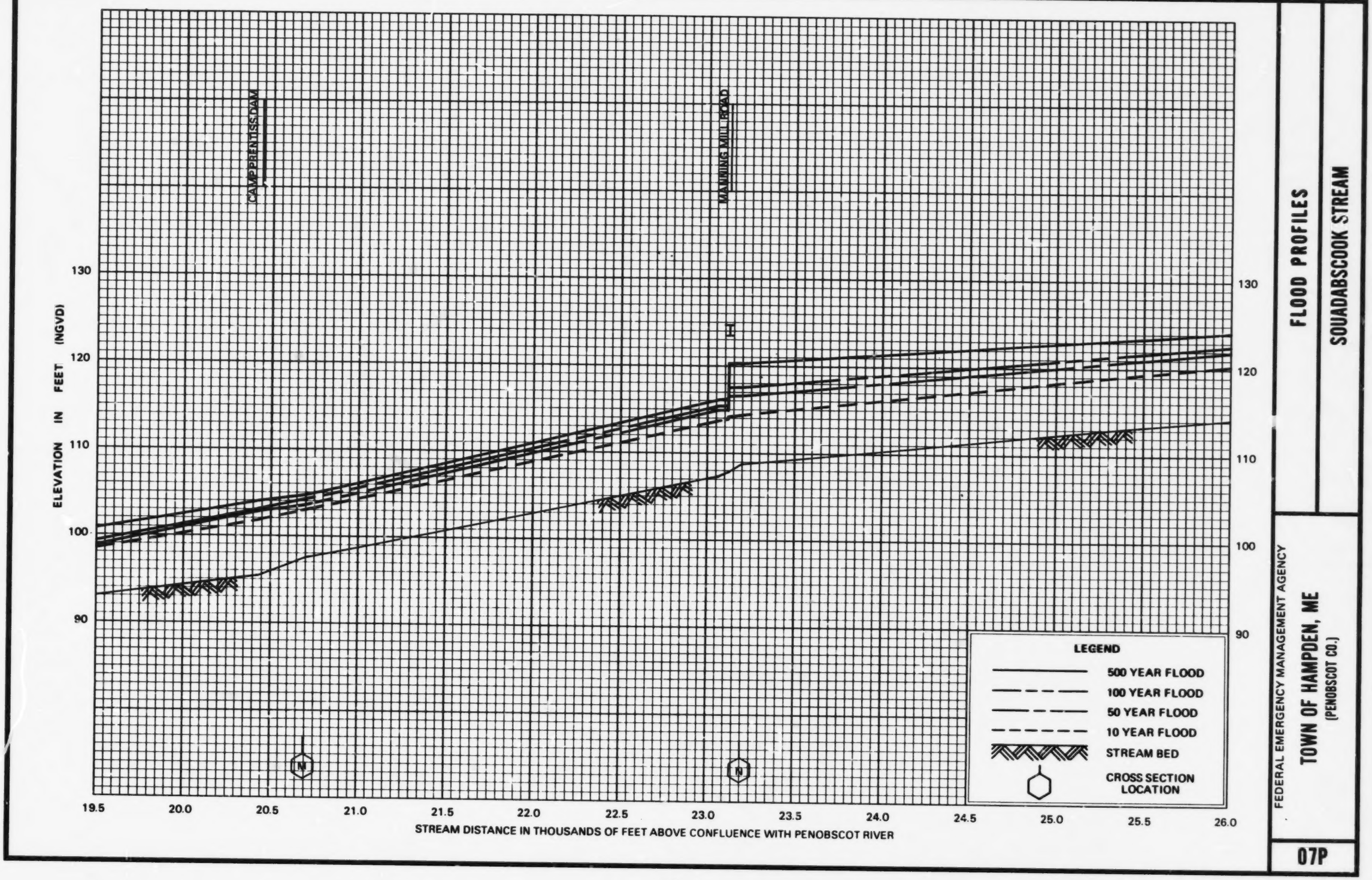

FLOOD PROFILES

SQUADABSCOOK STREAM

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF HAMPDEN, ME
(PENOBSCOT CO.)

07P

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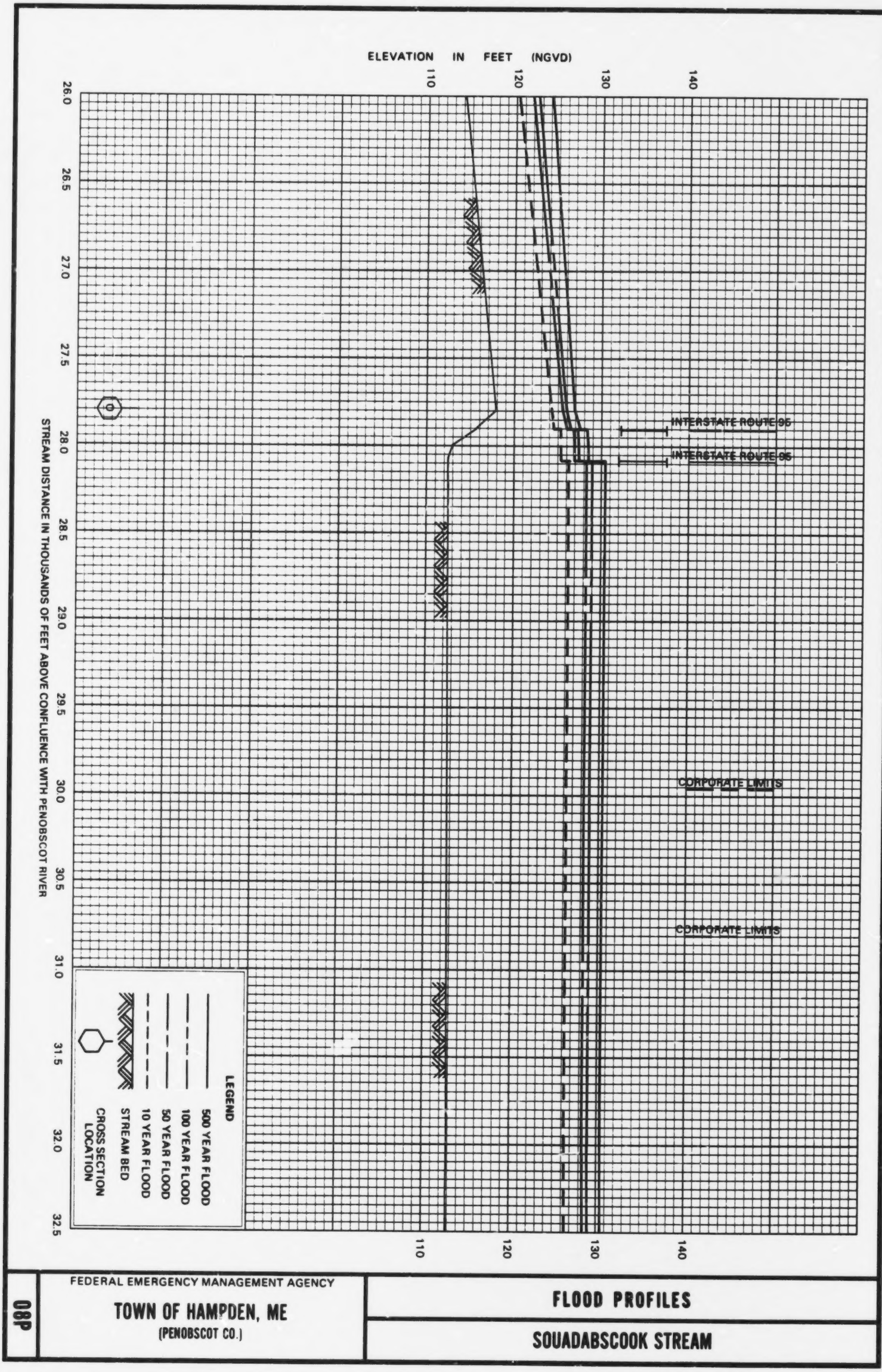

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF HAMPDEN, ME
(PENOBSCOT CO.)

FLOOD PROFILES

SOUADABSCOOK STREAM

08P

28

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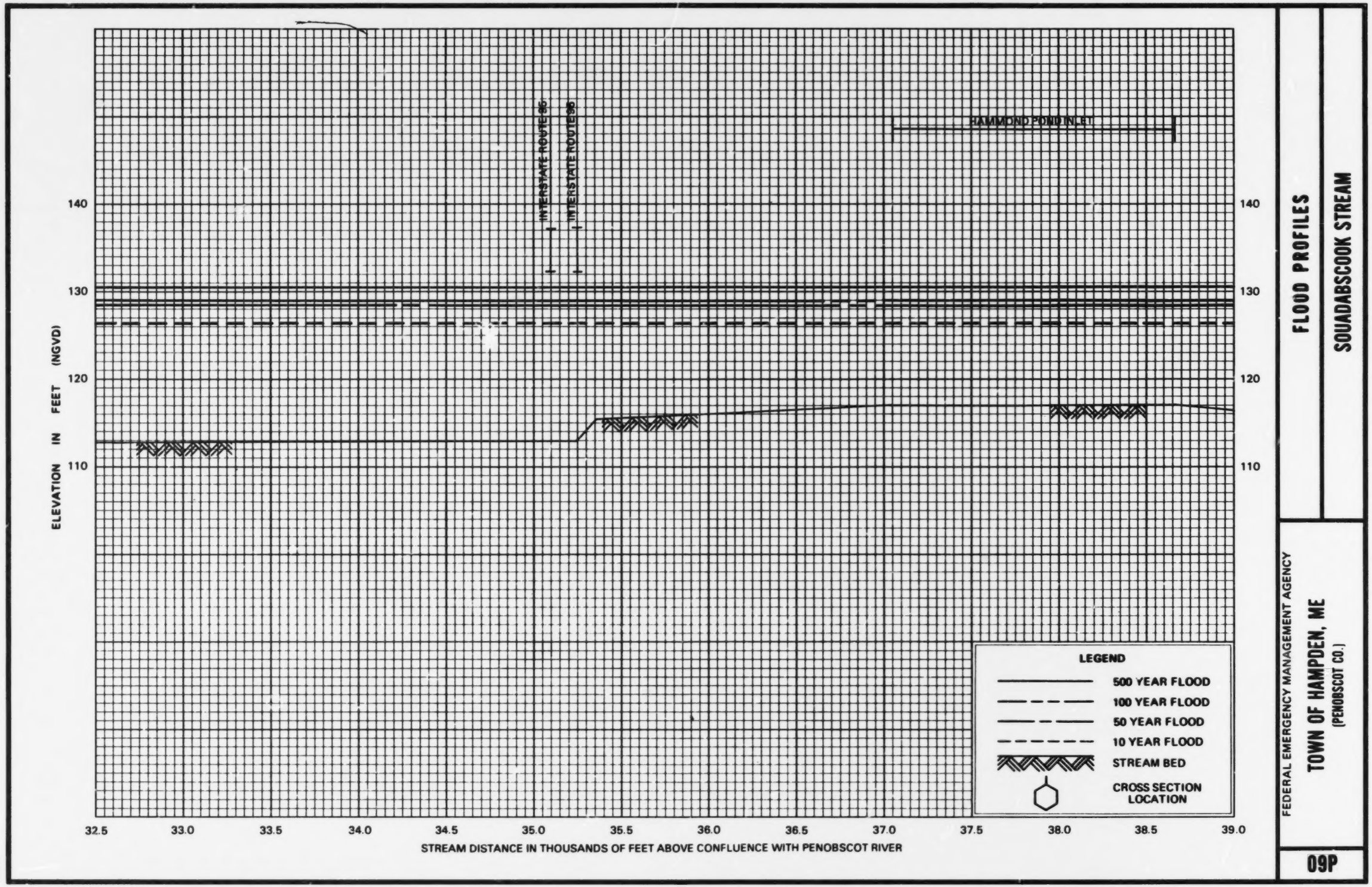

FLOOD PROFILES

SOUADABSCOOK STREAM

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF HAMPDEN, ME

(PENOBSCOT CO.)

09P

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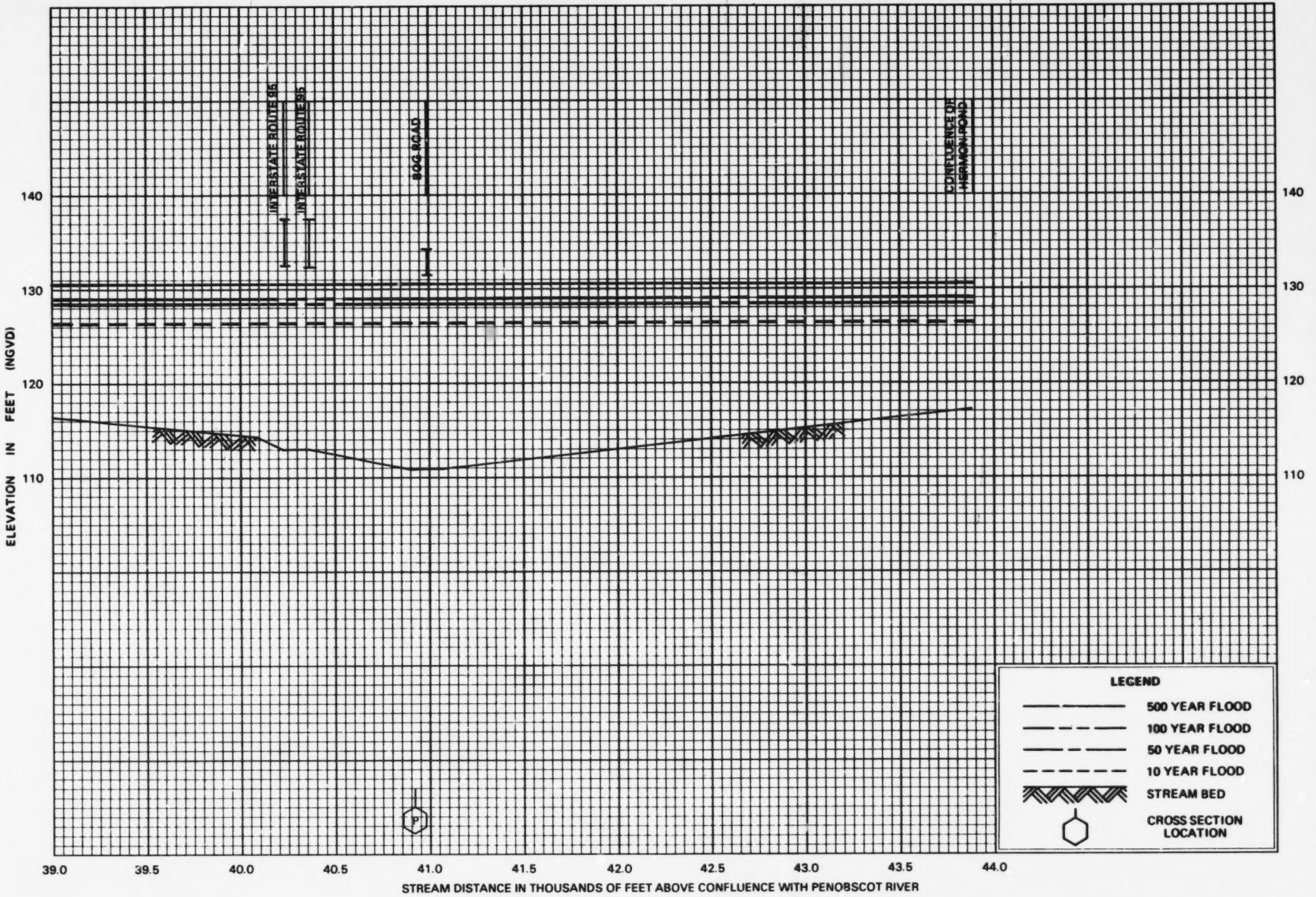

FLOOD PROFILES

SOUADABSCOOK STREAM

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF HAMPDEN, ME
(PENOBSCOT CO.)

10P

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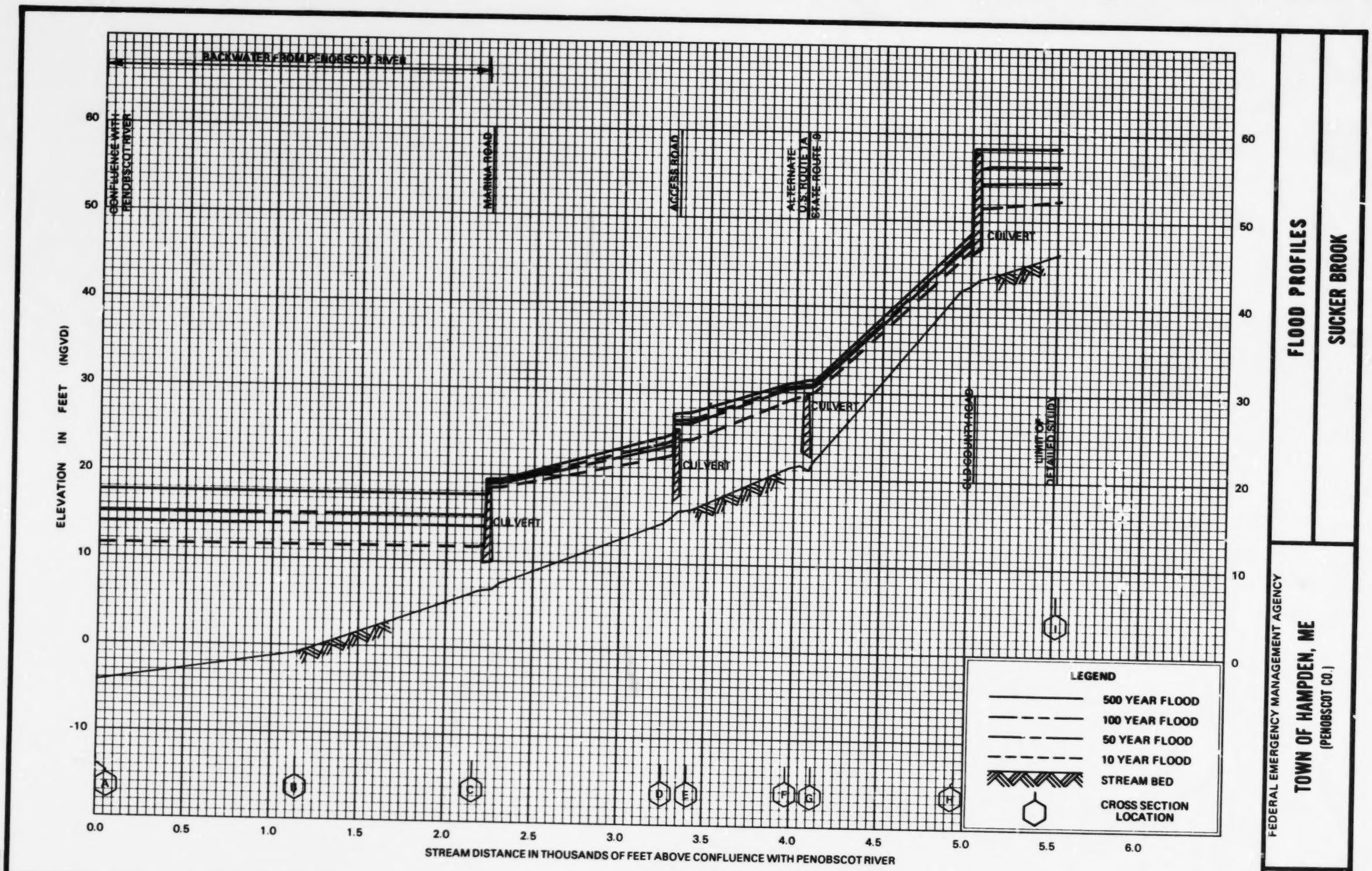

FLOOD PROFILES

SUCKER BROOK

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF HAMPDEN, ME

(PENOBSCOT CO.)

11P

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